UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

June 15, 2020

Via Delivery as Email-attachment

Mr. Prashant K. Gupta
Honeywell, Inc.
115 Tabor Road
Morris Plains, NJ 07950

Re: CO2 Sparging Phase 4 Full Implementation and Monitoring Report dated December 20, 2019: OU2 (Mercury Cell Buildings and Groundwater): LCP Chemicals National Priorities List Site, Brunswick, Glynn County, GA

Dear Mr. Gupta:

The purpose of this letter is to comment on your submission of the CO2 Sparging Phase 4 Full Implementation and Monitoring Report ("Phase 4 Sparge Report") dated December 20, 2019. The EPA is requiring revisions to the Phase 4 Sparge Report according to Paragraph 15.b of the Administrative Order on Consent for Removal Action (CERCLA Docket-04-2007-3760). The objectives for conducting the sparging are to: 1) reduce the pH of the CBP to between 10 and 10.5; and 2) reduce the density of the CBP. EPA concurs that the sparging events have been successful in reducing the pH and density of the CBP. However, there remain areas of the plume that have elevated mercury in groundwater. To help facilitate the reduction of mercury at the Site, additional injections of CO2 or other actions may be needed in the future. Please note that additional groundwater monitoring to evaluate pH rebound is still needed, and that the agreed-upon criteria must be met prior to discontinuing such monitoring. The attached comments must be addressed, and the document revised, before full approval of the Phase 4 Sparge Report will be considered. Responses to the comments must be submitted to EPA within 30 days from receipt of this letter.

If you have questions regarding the preceding, please contact me at (404) 562-8506.

Sincerely,

ROBERT POPE Digitally signed by ROBERT POPE
Date: 2020.06.15 09:53:25 -04'00'

Robert H. Pope, Senior Remedial Project Manager
Superfund Restoration & Sustainability Branch
Superfund & Emergency Management Division

Enclosure

cc: J. McNamara, GAEPD

TECHNICAL REVIEW OF THE
CO2 SPARGING PHASE 4 FULL IMPLEMENTATION AND MONITORING REPORT
DATED DECEMBER 20, 2019

LCP CHEMICALS SITE
BRUNSWICK, GEORGIA

I. GENERAL COMMENTS

1. The CO_2 Sparging Phase 4 Full Scale Implementation and Monitoring Report dated December 20, 2019 (hereinafter referred to as the Phase 4 Sparge Report) does not indicate whether additional pH monitoring will be performed at the Site. The Phase 4 Sparge Report recommends no additional sparging at the Site because extensive rebound of pH above the remedial action objective (RAO) of 10.5 is not expected. However, some pH rebound has been observed over time, and the pH at some locations remains elevated. For example, Table 4-1, Summary of Pre- and Post-Sparge pH in Deep Satilla Monitoring Points indicates that the pH at MW-512B increased from 7.21 to 8.7 between the Sitewide 2017 sampling event and the Pre-Phase 4 sampling event. As stated in the Phase 4 Sparge Report, MW-361B remains above a pH of 10.5, and only two pH measurements (i.e., Pre- and Post-Phase 4) have been recorded for this location. It is noted for MW-361B the Pre-Phase 4 pH measured 10.42 and the Post-Phase 4 pH increased to a level of 10.79. Revise the Phase 4 Sparge Report to discuss future pH monitoring at the Site and criteria proposed for evaluating rebound to ensure the RAOs will continue to be met over time.

2. While most wells demonstrated lower Hg concentrations in groundwater post sparging events, according to the September 2019 groundwater sampling data from the Phase 4 sparging event, monitoring well MW-362B had an elevated detection for Hg (21.10 ug/L), and monitoring well MW-361B (April 2019 0.0 ug/L, September 2019 1.20 ug/L) is potentially rebounding based on the increasing detections for Hg. Elevated detections for Hg could be attributed to wells being located along the perimeter of the actual sparging event and/or being influenced by upgradient groundwater impacting the well screen area. Please comment and consider how these elevated levels will be monitored and addressed in the future.

II. SPECIFIC COMMENTS

1. **Section 2.1.2, Sparge Well Installation and Development, Page 2-1:** The text states that a sparge well development goal of 50 Nephelometric Turbidity Units (NTU) was set; however, this goal was not met. According to Appendix B, only two sparge wells were developed to NTUs below 50. The majority of sparge wells were completed with turbidity readings greater than 1,000 NTUs. Revise the Phase 4 Sparge Report to discuss the impacts of not meeting this goal, such as possible reduced radius of influence (ROI) from covered screens, etc.

2. **Section 3.1.1, Monitoring Wells and Extraction Wells, Page 3-1:** The text references the U.S. Environmental Protection Agency (EPA) March 2013 "Field Branches Quality System and Technical Procedures" groundwater sampling operating procedure (SOP); however, this SOP is outdated and was revised in April 2017. Revise the Phase 4 Sparge Report to reference the updated SOP, and ensure appropriate methodology was followed.

3. **Section 3.1.1, Monitoring Wells and Extraction Wells, Page 3-1:** The text states that depth-to-water measurements were collected during purging to maintain stable drawdown. Depth-to-water

measurements collected during purging are used to determine proper pumping rates in order to minimize drawdown, ensuring the groundwater sample collected is from the screened interval and not stagnant water drawn down from above. The purge logs provided in Appendix C indicate that many of the monitoring wells had drawdown greater than recommended levels (0.33-foot per EPA's 2002 "Ground-water Sampling Guidelines for Superfund and RCRA Project Managers" and other regulatory SOPs). Revise the Phase 4 Sparge Report to include discussion of above-average drawdown at wells during sampling and the potential impact to data collected because of the drawdown.

4. **Section 3.6, Air Monitoring, Table 3-7, Summary of Air Monitoring Results, Page 3-10:** The table lists an action level for oxygen of greater than 19.5% and less than 22.0%; however, this is the target level for oxygen, not the action level. In addition, this table is misidentified as Table 3-8 in the table of contents (TOC). Furthermore, the tables presented in Appendix E list the oxygen action level as less than 19.5% or less than 22.0%. Revise the Phase 4 Sparge Report to indicate that the action level for oxygen is less than 19.5% and greater than 22.0% and correct the table title to match the TOC.

5. **Refer to Figure 4-6 Pre-sparge (Phase 4) pH in deep Satilla monitoring and extraction wells and Figure 4-25 Post-sparge (Phase 4) pH in deep Satilla monitoring wells for comparison of pH values from the Phase 4 post injection event within the deep Satilla Formation.** Phase 4 injection zone has six monitoring wells constructed within the deep portion of the Satilla Formation. Four wells had increased detections for pH compared to the pre-sparging data. Only wells MW-514B and MW-362B had a decreasing detection for pH. Please comment on how this will be addressed.

6. As stated within the Phase 4 Sparge Report, "Dissolved Hg speciation in the presence of sulfide is dominated by: complexes with sulfide such as HgHS-, HgSi2-; complexes with polysulfides such as Hg(S,)i2- and HgSxOW; complexes with thiol groups present on dissolved organic matter (DOM); and HgS(s) precipitated as metacinnabar or cinnabar. Solubility of Hg in the presence of sulfide generally decreases with decreasing pH as a result of precipitation of Hg sulfide, HgS(s)." These statements indicate that sampling should be performed for the presence of sulfides within soils post sparging event(s) to confirm that Hg is being converted into a metacinnabar and/or cinnabar within the Satilla Formation. Please comment if this type of sampling is planned and if not, why not.

7. **Refer to Figure 3-4**: Interpolated alkalinity values in the Satilla using data from deeper monitoring well locations, there continues to be isolated zones of alkalinity that range from 10,000 to 26,000 mg/L. CO_2 sparging events within these areas were intended to lower the alkalinity concentration. It is **recommended that** areas of the Site with elevated detections for alkalinity should be reevaluated for additional injections of CO_2 to help lower the alkalinity concentration or that other actions be evaluated and implemented to lower alkalinity with the goal of reducing metals concentrations in groundwater.

8. **Refer to Figure 2-2**: The Phase 4 injection zone currently has six deep monitoring wells (MW-514B, -351B, -352B, -355B, -361B, and -362B) constructed within and/or adjacent to the footprint area used for monitoring groundwater conditions for pre- and post sparging events. Presently, the monitoring network system is constructed for monitoring groundwater conditions within and adjacent to the central and southern portions of the Phase 4 injection zone. The monitoring well network system as it is presented within Figure 2-2 appears to fail to adequately monitor groundwater conditions within the northern portion of the Phase 4 injection zone. Additional groundwater monitoring wells in the northern portion of the Phase 4 injection zone must be evaluated for future work at the site.

9. **Page 4-15**: Table 4-6 is referenced within the Report but could not be located.

10. **Page 4-16**: Figures 4-39, 4-40 and 4-41 are referenced within the Report but could not be located.

COMMENTS PROVIDED BY THE ENVIRONMENTAL PROTECTION DIVISION OF THE GEORGIA DEPARTMENT OF NATURAL RESOURCES

1. **Discrepancy in Equation:** Pg 4-2, Error % equation – Equation 4-2 has the term "$M_{delivered}$" in both the numerator and denominator. However, **Equation 4-3** has different values shown for this variable; why?

2. **Clarification on Table Reference:** Pg 4-13 on – several references are made to Table 4-6, which doesn't exist in the document. Do you mean Table 4-5?

3. **Text Clarification:** Pg 4-16 – reference is made to a sulfide mechanism being responsible for reductions in Hg solubility. Efforts by the RPs in the past, including SEM analysis, have failed to prove this. In the absence of proof, this must be clearly stated as a hypothesis.

4. **Recommendations:** pg. iii of the CO2 Phase 4 Sparging Report - *The AOC for the caustic brine plume requires that the pH be reduced to 10 to 10.5 and that density be reduced. As a result of the phased CO2 sparging effort. Rebound of PH to values greater than 10.5 has been minimal during the rest period in-between phases. Therefore, rebound (above the RAO of 10.5) is not expected. No additional sparging at the Site is recommended as the CO2 treatment has achieved the RAOs."* It seems that we still have some locations that has not reached the desired pH range, so it may be too soon to state whether no additional sparging is necessary, especially when the pH is closer to 10.5 than to a neutral pH. Discussion needs to occur as to whether all or a portion of the infrastructure will remain in place and we need to ensure that ARARs are being met at the site if sparging is recommended to be discontinued after Phase 4.

5. **Tables and Figures:** Table 4-1 and Figures 4-12, 4-13, 4-16 and 4-22 – more explanation is required to explain the pH kickback between sparging events in wells MW-352B, EW-4, MW-513B, MW-512B and the lack of effect in MW-358B and MW-112C. According to the report, only one well was not influenced by sparging as MW-361B had a post sparging pH of 10.79.

6. **All Figures**: The location of the Legend in the upper left corner of the page results in the holes punched for (required) hard copies obscuring data points. This is particularly problematic on Figures 4-5, 4-7, 4-8, 4-9 and 4-26, where two indicators are obscured.

7. **Figure 1-3**: See Pg 4-16 comment

8. **Figure 2-3**: A Legend or Key is needed

9. **Figures 4-2 and 4-4**: Change the bar colors, the shades of green used make it difficult to differentiate between Phase 2 and Phase 3

10. **Figure 4-38**: The figure shows "Pre-Phase 1" data points with a lower pH than "Post-Phase 1".